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TITLE: TISSUE-LIKE PROTEIN AND METHOD FOR PRODUCING
PROCESSED FOOD USING THE SAME

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ABSTRACT:

PROBLEM TO BE SOLVED: To provide a processed food which has a just made juicy texture, even when frozen, distributed and then reheated, and to provide a tissue-like protein for imparting such the function.

SOLUTION: This tissue-like protein obtained by heating, pressurizing and swelling soybean protein, casein and water as main components with an extruder, and to provide the processed food obtained by using the tissue-like protein and then freezing the product.

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(54) 【発明の名称】 組織状蛋白及びこれを用いた加工食品の製造法

(57) 【要約】

【課題】本発明は、冷凍後、流通過程を経たのち、喫食時に再加熱を行っても、作りたてのジューシー感を提供できる加工食品を目的とし、かかる機能を付与する組織状蛋白を目的とした。

【解決手段】大豆蛋白、カゼイン及び水を主成分として押出機を用いて加熱加圧し膨化してなる組織状蛋白、及びこの組織状蛋白を利用して凍結した加工食品。

【特許請求の範囲】

【請求項1】大豆蛋白、カゼイン及び水を加熱加圧し大気中に押し出して膨化してなる組織状蛋白。

【請求項2】該組織状蛋白原料中の大豆蛋白／カゼインの割合が98／2～35／65（乾燥固形重量比）である請求項1の組織状蛋白。

【請求項3】澱粉類を用い、該組織状蛋白原料中の澱粉含量が60重量％以下（原料乾燥固形分中）である請求項1または請求項2の組織状蛋白。

【請求項4】該組織状蛋白の吸水能が5～12重量倍である請求項1～3のいずれかの組織状蛋白。

【請求項5】該組織状蛋白原料乾燥固形分中の油分が3重量％以下である請求項1～4のいずれかの組織状蛋白。

【請求項6】請求項1～請求項5のいずれかの組織状蛋白と加工食品原料を混合し成形し加熱調理した後凍結することを特徴とする加工食品の製造法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、凍結し解凍した後でも作り立てと同様のジューシー感を有する加工食品及びこの加工食品に用いる組織状蛋白に関するものである。

【0002】

【従来の技術】共働き、核家族化といった更なる社会環境の変化に伴ない、調理済加工食品のニーズは年々高まっており、食肉を主原料とする加工食肉製品又は調理済惣菜の食卓での利用が盛んになっている。美味しさへの追求が高まっているにもかかわらず、調理済み加工食品は作り立ての美味しさを提供出来ていないのが現状である。特に、食肉の作り立てのジューシー感が求められるハンバーグ、ミートボール、餃子、しゅうまい、中華まん等はメーカーにて加熱調理された後、冷蔵や冷凍等の流通後、家庭等で再加熱して食す際、作り立てのジューシー感は感じられないという問題点がある。これを解決するために、これまで様々な取組みがなされてきたが、十分な解決には至っていない。

【0003】例えば、特開平11-103826号公報では、ジューシー感付与のためMPC（ミルクプロテインコンセントレート）を用いており、ジューシー感付与効果は認められるものの、風味的に強い乳臭を感じ不良であった。また、特開2001-118号公報では、ジューシー感付与のため、ハイドロコロイド、油、水を乳化させたのち、加熱し、切断したものを生地に加えるという煩雑な工程が必要で作業性が悪く問題であるばかりか、ジューシー感付与効果が十分ではなかった。

【0004】ところで、従来より、植物性蛋白原料等を加熱加圧下で押し出して組織状大豆蛋白を製造することが行われてきた。そして、このように製造された組織状大豆蛋白をハンバーグ、ミートボール、餃子、しゅうまいなどの様々な加工食肉製品に肉の代替品として利用

し、これら加工食肉製品の品質を向上させることが広く行われてきた（肉粒感付与、歩留り向上、ソフト感付与など）。しかしながら、ジューシー感を付与させるには至っていなかった。これら組織状大豆蛋白と本発明の組織状蛋白との違いは以下の通りである。

【0005】まず、大豆蛋白（特に脱脂大豆）を水系下に加圧加熱して押し出して膨化させて製造した組織状大豆蛋白は膨化が本発明の組織状蛋白に比べて小さく、湯戻し後の食感も荒くごわごわした感じでソフトでかつジューシーな食感に欠けるものである。また、大豆蛋白に澱粉を加えて同様に押し出した組織状大豆蛋白は膨化は大きく湯戻し後の吸水も大きい、凍結し解凍するとベチャベチャした粘性を感じる食感になり、本発明の加工食品のようなソフトでかつジューシーな食感になりにくい。また、大豆蛋白に小麦蛋白及び必要により澱粉を併用して同様に押し出して得られる組織状大豆蛋白は、押し出し条件によっては膨化を大きくすることもできるが、湯戻しし、ハンバーグに用いた場合、凍結し解凍した後の食感は本発明の組織状蛋白より堅固でしっかりしており、ソフトでかつジューシーな食感を得るには至らなかった。また、大豆蛋白とWPC（乳ホエー蛋白）を併用して同様に押し出して得られる組織状大豆蛋白は膨化が抑えられ、組織もしっかりしており、本発明のように吸水がよくないので、そのまま使用してもハンバーグなどの調理加工食品に用いた場合、ソフトでかつジューシーな食感となるに足らず、多糖類をハンバーグ原料に併用するなどの工夫が必要である。また、大豆蛋白とカゼインを原料に用いて水系下に加圧加熱して押し出して組織状蛋白を製造する従来技術として以下が知られているが、油脂が必須要件であり、本発明とは目的が異なり、大豆蛋白とカゼインを併用しても油脂を用いると膨化が抑制されて、得られる組織状大豆蛋白は吸水が低く、目的のソフトでかつジューシーな食感にはなりにくい。

【0006】例えば、特開昭63-192348号公報には、レンネットカゼインに油脂及び乳化剤としての大豆蛋白を用いて押し出し機にて繊維状組織を有する食品を製造する方法が開示されている。しかし、大豆蛋白は乳化剤として少量用いられているに過ぎず、得られる繊維状組織を有する食品も膨化したものではない。また、特開平5-244877号公報には、大豆蛋白と油脂とカゼインを併用し、油分の量が多くなった場合であっても、組織化された組織状蛋白食品を得るものであるが、膨化が小さく本発明より吸水が低いいため、加工食品に用いた場合にソフトでかつジューシーな食感を与えるには不十分である。

【0007】

【発明が解決しようとする課題】本発明は、かかる事情に鑑みて開発されたものであり、加工食品が冷凍後、流通過程を経たのち、喫食時に再加熱を行っても、作り立

てのジューシー感を提供出来ることを目的とする。そして、かかるジューシー感を与える組織状蛋白を目的とする。

【0008】

【課題を解決するための手段】本発明者等は、前記課題を解決すべく鋭意研究を重ねた結果、大豆蛋白、カゼイン及び水を必須とし、必要により澱粉類を加熱加圧し大気中に押し出して膨化させて得た組織状蛋白を加工食品に用いることで、冷凍にて流通した後も、再加熱時に作り立てと同様のジューシー感を有する加工食品を提供出来ることを見出して本発明を完成したものである。即ち、本発明は、大豆蛋白、カゼイン及び水を加熱加圧し大気中に押し出して膨化してなる組織状蛋白である。該組織状蛋白原料中の大豆蛋白／カゼインの割合が98／2～35／65（乾燥固形重量比）であることが好ましい。澱粉類を用い、該組織状蛋白原料中の澱粉含量が60重量％以下（原料乾燥固形分中）が好ましい。該組織状蛋白の吸水能が5～12重量倍であることが好ましい。該組織状蛋白原料乾燥固形分中の油分は3重量％以下が好ましい。又、本発明は、上記記載の組織状蛋白と加工食品原料を混合し成形し加熱調理した後凍結することの特徴とする加工食品の製造法である。

【0009】

【発明の実施の形態】本発明の組織状蛋白について説明する。

【0010】本発明に用いる大豆蛋白としては、脱脂大豆、豆乳粉末、分離大豆蛋白、濃縮大豆蛋白等、及びそれらの混合物からなる群から選ぶことが出来るが、風味の観点から、特に分離大豆蛋白を用いることが好ましい。全脂大豆も用いることができるが、油分が乾燥固形分中20重量％前後存在するので、後述するように加熱加圧して押し出す前の原料中の油分が3重量％以下とすることが肝要である。大豆蛋白の種類により異なるが、本発明において、該組織状蛋白原料中の大豆蛋白の量は98～35重量％、好ましくは98～45重量％（乾燥固形重量比）が適当である。

【0011】本発明に用いるカゼインとしては、市販のカゼインを用いることが出来る。例えば、カゼインナトリウム（或いはナトリウムカゼイネイト）、レンネットカゼインなどが好ましく、酸カゼインは中和して用いることができる。即ち、アルカリ金属塩のかたちで中和されたものが好適である。本発明に用いるカゼインは以下の乳成分に比べカゼイン蛋白質の含有量が多く、通常粗蛋白質含有率が90重量％以上、好ましくは95重量％以上が適当である。特に、ナトリウムカゼイネイトが好適である。ところで一般に乳から乳脂を分離して噴霧乾燥したものを脱脂粉乳といい、これはカゼイン、ホエー蛋白、ホエー糖類を併含するものである。この脱脂粉乳からホエー糖類などの低分子画分を除いたものがMPC（ミルクプロテインコンセントレート）であり、カゼイ

ンとホエー蛋白を併含するものである。また、脱脂粉乳から酸沈殿やレンネット凝固沈殿させてカゼインを分離することができ、残りのホエーからホエー糖類を分離除去したものがWPC（ホエー蛋白濃縮物）である。上記脱脂粉乳、MPC、WPC等の乳成分はカゼイン以外の成分を含み、カゼイン蛋白質の含有率が低く、ナトリウムカゼイネイトのようなアルカリ金属塩のかたちをとっていないので、本発明の目的達成には効果が極めて少ないものである。

【0012】本発明のように大豆蛋白とカゼインを併用して水系下に加圧加熱して押し出すと膨化が促進されるが、大豆蛋白と脱脂粉乳の併用では膨化が劣り、強い乳臭が加工食品の種類によっては邪魔になる。大豆蛋白とMPCの併用も同様に強い乳臭が感じられて加工食品の種類によっては邪魔になる。大豆蛋白とWPCの併用ではなおさら膨化が抑制される傾向にある。以上のように膨化が抑制され吸水率が低いと加工食品に用いた場合にソフトでかつジューシーな食感にはなりにくい。本発明において、該組織状蛋白原料中のカゼインの量は2～65、好ましくは2～55（乾燥固形重量比）が適当である。

【0013】本発明に用いる水の量は特に限定しないが、目的の組織状蛋白が十分に膨化するように押出機を運転しながら調節することができる。

【0014】また、本発明は油脂を添加しないことが好ましい。もし、油脂を添加する場合でも、油分の高い原料を用いる場合でも加圧加熱して押し出して膨化させる前の原料の油分が乾燥固形分換算で3重量％以下、好ましくは2重量％以下、より好ましくは1重量％以下とすることが適当である。大豆蛋白とカゼインを主原料として他の原料を用いる場合でも得られる組織状蛋白の膨化を促進させるために油分が低いことが必要である。油分の高い原料を押出機で押し出すと膨化が抑制されて、得られる組織状蛋白の吸水能が小さくなり加工食品に用いてもソフトでかつジューシーな食感にすることは困難になる。

【0015】本発明の組織状蛋白の製造において、大豆蛋白及びカゼインに、必要により澱粉類を併用することが好ましい。澱粉類を使用するとコストダウン効果が期待できるが、その添加量が多すぎると、該組織状蛋白を加工食品に用いて凍結して解凍した場合に、ベチャベチャしたような粘性的食感が発現する（ソフト感はあるがジューシーでない）ので好ましくない。従って、本発明において、該組織状蛋白原料中の澱粉類の含量が大豆蛋白の蛋白質の含量よりも高い場合には60重量％（乾燥固形重量％）以下、通常大豆蛋白を用いる場合でも好ましくは30重量％（乾燥固形重量％）以下であるのが適当である。上記以外の含量の場合は、澱粉の特徴が顕著に現われてベチャベチャし不良な食感になりやすく好ましくない。本発明の目的を達成する為には、澱粉類は

必ずしも必要ではないが、より安価に目的を達成するという観点から、配合するのが好ましい。

【0016】本発明において、澱粉類としては、例えば、甘藷、ジャガイモ、玉蜀黍、タピオカ、米、大麦、オーツ、ライ麦、燕麦、蕎麦、トウモロコシ、小麦、キャッサバ等やこれらの未精製およびこれら由来の澱粉等、及びそれらの α 化、ばい焼、加水分解等の処理を行った加工澱粉類、澱粉誘導体、アルカリ澱粉、分画澱粉、物理処理澱粉等、並びにその混合物からなる群から選ぶことが出来る。

【0017】大豆蛋白の種類やカゼインの種類により蛋白含有量は異なるが、本発明において、該組織状蛋白原料中のカゼイン/大豆蛋白の割合は98/2~35/65(乾燥固形重量比)、好ましくは98/2~45/55(乾燥固形重量比)が適当である(必ずしも蛋白質の割合ではなく、蛋白原料の割合である。)。上記以外の割合の場合は、ソフトでかつジューシーな食感にはならず、上記範囲内でソフトでかつジューシーな食感を付与する効果が高い。カゼインの割合が少なく大豆蛋白の割合が多いと、得られる組織状蛋白の膨化が十分でないばかりか、組織が強く加工食品に用いた場合にジューシー感が得られないばかりでなく、食感がごわごわして加工食品のソフトな食感と不適な場合がある。また、カゼインの割合が多過ぎ大豆蛋白の割合が少な過ぎると、得られる組織状蛋白の膨化が抑制されて、吸水能が小さくなる。すなわち、該組織状蛋白を加工食品に用いた場合、ソフトでかつジューシーな食感を付与する効果が得られない。これはカゼインが熱溶融性蛋白であり加圧して膨化することが抑制されるためである。

【0018】以上が主成分であるが、必要により大豆蛋白以外やカゼイン以外の蛋白や、蛋白以外の原料を併用することも出来る。例えば、動物・微生物由来の蛋白、油糧種子、あるいは穀物種子由来の蛋白あるいはその混合物からなる群から選ぶことが出来る。澱粉以外の炭水化物、多糖類、ガム質などを併用することも可能である。

【0019】本発明において加圧加熱し大気中に押し出す装置としては公知の装置を利用することができるが、押出機(エクストルーダー)が適当である。本発明に用いる押出機としては、公知の押出機が使用出来、効果確認等の為には一軸押出機でも良いが、安定した膨化と吐出を得るためには、二軸以上の軸を有する押出機を用いる方が好ましい。即ち、原料の油分が1重量%以下であれば大豆蛋白とカゼインの併用により得られる組織状蛋白は1軸押し出し機でも膨化しソフトでかつジューシーな食感を持つことができるが、油分が1重量%を超えると1軸押出機では膨化が抑制され目的のジューシー感を持つに十分ではなくなる。2軸押出機を用いると油分が3重量%以下までなら目的のソフトでかつジューシーな食感を付与するのに十分な膨化を起こすことができる。

従い、2軸以上の多軸押出機が好ましい。押出機は、原料供給口、バレル内をスクリーにおいて原料送り、混合、圧縮、加熱機構を有し、更に先端バレルに装着されたダイを有するものであれば利用出来る。バレルはジャケットを有していても有していなくても良く、これにより加熱するしないはあるいは冷却するしないは自由である。

【0020】該組織状蛋白の組織化条件は、目的とする組織状蛋白に応じて実験的に定めることが出来る。具体的には、組織化に用いる水は、エクストルーダーに供給された原料や添加水等からなる生地の中に含まれる水分が15~50重量%、好ましくは20~45重量%が適当である。この水分範囲で目的の膨化した組織状蛋白を得ることが出来る。また、本発明の組織化温度は、先端バレル温度140℃~190℃、より好ましくは150℃~185℃に加熱し、5~50kg/cm²に加圧して押し出すのが適当である。

【0021】以上のようにして得られた組織状蛋白は、カッターもしくは粉碎機等で適当な大きさに切断することが出来る。この組織状蛋白は、挽き肉を用いる加工食品、例えばハンバーグなどに用いる場合は、挽き肉の大きさに粒度を調整することが好ましい。この組織状蛋白は、乾燥して用いることができるが、この場合には、ドラム乾燥法、流動層乾燥法、棚式乾燥法、凍結乾燥法等を用いることが出来る。

【0022】次に、膨化について説明する。膨化の適当な指標として吸水能で表現するのが適当である。即ち、膨化が大きいほど吸水能が大きく、加工食品に用いた場合ソフトでかつジューシーな食感を付与する効果が大きいからである。吸水能は、以下のようにして測定し、実施例においても同様にして測定した。

【0023】(吸水能の測定方法)30gの評価用サンプルを500mlビーカーにとり、450gの25℃の水を加え、10分放置後、30メッシュ(目開き500 μ m)の篩を用い、1分間ざるで水きりした後の篩上の組織化物水戻し品の重量(W)を測定し、吸水倍率(X)を下記数式により算出した。

【数1】 $X = (W - 30) / 30$

【0024】以上のようにして得られる本組織状蛋白は、組織化物の重量に対して吸水能は5~12重量倍(25℃・10分・15重量倍加水で戻し、ザルで1分間水切り)で水分が15重量%以下であることが好ましい。吸水能が5重量倍未満だとソフトでかつジューシーな食感を十分に付与できない。また、吸水能は12重量倍を超えても良いが、12重量倍を超える組織化物を得ることは通常困難である。

【0025】次に、本発明の加工食品は、前述した組織状蛋白と加工食品原料を混合し成形し加熱調理した後凍結することにより製造される。組織状蛋白は加工食品原料の水分が極めて多い場合は水戻しは必ずしも必要では

ないが、通常吸水能以下の範囲で水戻して用いることが適当である。水の代わりに調味液のような水性溶媒を用いることは妨げない。混合は公知の装置を利用することができ、必要により混練することができる。成形は目的の加工食品により異なるが、公知の成形装置を利用することができる。加熱調理は目的の加工食品により適宜行うことができる。冷凍は公知の冷凍装置を用いることができ、緩慢凍結より急速凍結が好ましい。

【0026】具体的に本発明の組織状蛋白を利用した加工食品について説明する。加工食品は、冷凍食品であって、解凍したときに冷凍前と同様のジューシー感を要求される食品であれば特に限定するものではない。本発明の組織状蛋白を含んで、その加工食品原料と混合或いは必要により混練して、成形し、好適には加熱調理し、冷凍した加工食品であれば動物性、植物性を問わない。尚、組織状蛋白の加工食品への添加量は、加工食品の種類により異なるが、水で戻した組織状蛋白を加工食品の原料を用いて調製した生地に対して5〜80重量%、好ましくは10〜60重量%が適当である。加工食品の種類にもよるが、水で戻した組織状蛋白の添加量が少ないと目的のジューシー感が発現しがたく、多過ぎると加工食品の特性が失われる。

【0027】植物性加工食品としては、例えば、本発明の組織状蛋白と豆腐を混合し必要により調味し加熱して凍結したり、本発明の組織状蛋白と大豆蛋白のアルカリ土類金属或いは豆腐用ニガリで凝固したいわゆる豆腐カードを混合或いは混練し加熱調理し冷凍したりすること等により得ることができる。

【0028】動物性加工食品のより具体的な例として、挽き肉等を用い調製する惣菜があるが、これらの例としてはハンバーグ、ミートボール、餃子、しゅうまい、中華まん、チキンナゲット、ソーセージ等を挙げることができる。例えば、ハンバーグの製造法を例示する。あらかじめ吸水能以内の加水量で戻した組織状蛋白を挽き肉等と混合し使用することが可能である。組織状蛋白の加水については、水戻しも可能であるが、必要に応じて、醤油・酒類・食塩・香辛料・エキス類・糖類・油脂類・卵等を加えた着味液を用いても良い。又、組織状蛋白は吸水能に応じた加水量で戻して使用しても良いが、生地中の水分含量や加熱時の水分移行などを考慮し、吸水能以下の加水量で戻して使用しても良い。また、作業性を重視する場合などはそのまま組織状蛋白を乾燥状態で添加しても良い。まず、挽き肉をミキサー等で攪拌し、順に組織状蛋白、卵、生クリーム、調味料、野菜、澱粉、パン粉等を加え、混合し生地を作成する。その後、成形し、中心温度が80℃以上になるよう加熱処理を行う。加熱処理については、焼成、蒸煮、フライ等が可能である。加熱調理した加工食品は冷凍する。

【0029】本発明の加工食品は冷凍した後、解凍して再加熱などをして食しても、作り立てと同様のソフトで

かつジューシーな食感を付与する効果に特徴がある。

【0030】

【実施例】以下、実施例により本発明の実施態様を説明するが、例示は当然単なる説明であって、発想思想の内外・外延とは直接関係の無いものである。なお、以降「重量%」は「%」と記載する。

【0031】(エクストルーダー原料説明) 本発明の実施例で用いた原料は、下記の通りである。

・脱脂大豆粉は不二製油(株)製を用いた。

10 (成分 蛋白質/無水換算55%、水分6%)

・粉末状大豆蛋白は不二製油社(株)製「フジプロ-R」を用いた。

(成分 蛋白質/無水換算91%、水分6%)

・カゼインNaはMURRAY GOULBURN FOOD社製「ソデイウムカゼイネート」を用いた。(成分 蛋白質/無水換算95%、水分4%)

・MPCは、ミルコート社製「MPC-UF80」を用いた。

(成分 蛋白質/無水換算84%、水分4%)

・WPCはCALPRO社製「カルプロWPC8002」を用いた。

20 (成分 蛋白質/無水換算78.8%、水分4.4%)

・小麦グルテンはグリコ栄養食品(株)製「A-グルSS」を用いた。

(成分 蛋白質/無水換算77.5%、水分5%)

・澱粉は三和澱粉(株)製「コーンスターチ」を用いた。

(成分 蛋白質/無水換算 0%、水分13%)

・食用植物油は不二製油(株)製「大豆白絞油」を用いた。

(成分 蛋白質/無水換算 0%、水分0%)

【0032】(押出機による組織化物の作製) 組織化物を押出機で下記条件により作製した。原料は、粉体攪拌器等で均一混合し、水と共に押出機(幸和工業製KEI45-25)の原料に供した。運転条件は下記表1の通りであった。押出機から出てきた組織化物は、カッターで長さ10mm程度になる様に切断した後、粉碎機にて下記粒度となるよう粗粉碎した後、乾燥機にて水分10%まで乾燥させた。

【0033】

【表1】—押出機運転条件—

40 原料供給量	20kg/hr
加水量	8L/hr
スクリュウ回転数	200r.p.m.
バレル前半品温	30~100℃
バレル後半品温	100~180℃

—組織化物の粒度分布: JIS標準篩—

2.5 メッシュon (目開き 8.00mm) 0%

4 メッシュon (目開き 4.75mm) 30%

6 メッシュon (目開き 3.36mm) 40%

50 10 メッシュon (目開き 1.70mm) 20%

10 メッシュpass (目開き 1.70mm) 10%

【0034】-組織化物の評価方法-

『組織化物の単品系での評価法』

(吸水能測定は詳細な説明の項で述べた。)

【0035】(食感、風味の評価条件)組織化物水戻し品は、組織化物に、各々の吸水能に応じた量(例えば吸水能が3重量倍であれば、組織化物1重量部に対し3重量部)の25℃の水を加え、完全に組織化物が吸水するよう10分以上放置することにより作製した。得られた組織化物水戻し品は、10名の専門パネラーにより10点法で、食感、風味について試食評価を行った。食感については、もっとも柔らかい(ソフト)ものを10点とし、硬く感じられるものほど、点数を低くした。風味については、無味無臭のものを10点とし、大豆や乳等の風味が感じられるほど点数を低くした。

【0036】『組織化物の複合系(加工食品の系)での評価法』組織化物を加工食品(例えばハンバーグ、ミートボール、餃子)に用いた場合の効果について、各実施例に記載の各生地配合を用い、下記加熱調理条件にて、評価を実施した。なお、生地配合中に用いる組織化物水戻し品は、組織化物に、各々の吸水能に応じた量の25℃の水を加え、完全に組織化物が吸水するよう10分以上放置することにより作製した。

【0037】-ハンバーグ生地の加熱調理条件-

ハンバーグ生地は、1個100gとなるよう成形後、オーブンで200℃8分焼成を行いハンバーグを得た。生地成形の際、成形性について作業者が評価を行い、成形しやすいものを10点、成形しにくいものほど点数を低くした。

【0038】-ミートボール生地の加熱調理条件-

ミートボール生地は、1個15gとなるよう成形後、175℃の油で30秒フライ後、85℃10分間蒸煮を行いミートボールを得た。生地成形の際、成形性について作業者が評価を行い、成形しやすいものを10点、成形しにくいものほど点数を低くした。

【0039】-餃子生地の加熱調理条件-

餃子生地は、1個20gとなるよう餃子の皮で包餡後、175℃の油で30秒フライ後、90℃10分間蒸煮を行い餃子を得た。生地成形の際、成形性について作業者が評価を行い、成形しやすいものを10点、成形しにくいものほど点数を低くした。

【0040】-ハンバーグ、ミートボール、餃子の評価方法-

*得られた餃子は冷凍を行った後、フライパンを用いて加熱を行い、10名の専門パネラーにより10点法により、食感、風味について試食評価を行った。点数は10点が最も良好である。食感については、最もジューシー感があるものを10点とし、ジューシー感が少なくなりバサつきを強く感じられるほど点数を低くした。食感については、もっとも柔らかい(ソフト)ものを10点とし、硬く感じられるものほど、点数を低くした。風味については、肉の旨みがあるものを10点とし、他の味が強く感じられるほど低くした。

【0041】-実施例中の加工食品No.のつけ方-

H:ハンバーグ、M:ミートボール、G:餃子

※H1、H2は、ハンバーグの系で各々組織化物A1、A2(表2)を用いて作ったもの。

※H1①において①は組織化物を使っているが、加水量の違いで①、②に区別した。

※H0は、組織化物を使用しなかったもの。

を表している。

【0042】実施例1

(実施例1-A)下記表2の各原料配合を押出機に供し、各組織化物を得た。得られた各組織化物について、「組織化物の単品系での評価」を実施した。

【0043】

【表2】

組織化物No.	A1	A2
(原料配合(%))		
脱脂大豆	100	85
カゼインNa	-	15
(評価)		
吸水能(倍)	3.1	6.0
ソフト感(点)	4.3	7.2
風味(点)	2.9	5.4

【0044】(実施例1-B)豚挽き肉21.0g、牛ひき肉23.0g、豚脂3.5g、玉ねぎ20.0g、凍結全卵2.5g、生クリーム2.5g、赤パン粉5.0g、調味料2.0g及び香辛料0.5gに、表3の通り実施例1-Aで得られた各組織化物と水を配合してハンバーグ生地100gを調製し、「組織化物の複合系(ハンバーグ)での評価」を実施した。

【0045】

【表3】

(単位:g)

加工食品No.	H1①	H2①	H0①	H0②	H1②
組織化物水戻し品	20.0	20.0	-	-	20.0
(水)	15.1	17.1	-	20.0	17.1

1 1					1 2
(組織化物A1)	4.9	—	—	—	2.9
(組織化物A2)	—	2.9	—	—	—
ジューシー感X (点)	9.7	9.7	9.5	9.7	9.8
ジューシー感Y (点)	3.4	8.0	3.4	4.0	4.4
ソフト感X (点)	4.2	7.4	2.0	6.9	6.3
ソフト感Y (点)	4.1	7.4	2.0	6.1	5.4
風味X (点)	5.4	7.8	10.0	4.8	6.7
風味Y (点)	5.2	7.8	9.8	4.5	6.5
成形性 (点)	10.0	10.0	10.0	4.0	7.0

X: 作り立て

Y: 冷凍後再加熱

【0046】実施例1-Aおよび1-Bで示したように、組織化物A2は組織化物A1と比較し、ソフト感・風味に優れた食品素材であった。また、加工食品H2①は加工食品H1①と比較し、加工食品の作り立てのソフト感があり、ジューシー感を冷凍再加熱後も十分に維持出来るという機能性を有した優れた加工食品であった。このように、組織化物A2は、加工食品に用いた場合に、加工食品の作り立てのソフト感があり、ジューシー感を冷凍再加熱後も十分に維持出来る機能を有する組織状蛋白であった。加工食品H0②は、組織化物を使用していないものであるが、冷凍再加熱後ジューシー感を殆ど感じなかった。従来の脱脂大豆主体の組織化物A1を用いた加工食品H1①では、冷凍再加熱後にジューシー感を殆ど感じなかったのに対し、組織化物A2を用いた加工食品H2①では、冷凍再加熱後もジューシーであった理由が、大豆蛋白原料とカゼイン蛋白原料の併用ということだけでなく、単に水が多いからなのかもしれないと考え、加工食品H0②を作製した。加工食品H0②は、単純に水だけをハンバーグ生地中に添加したものであり、加工食品H1②は、組織化物A1を、組織化物A2の吸水能に準じた量の水で戻し、生地中に添加したものである。実施例1-Bに示したように、加工食品H0①のように単純に水を増量しただけでは、焼成前の生地が柔ら*

*かすぎて成形性が悪く問題であり、ジューシー感も加工食品H1①同様殆ど感じず不良であった。また、加工食品H0②も同様に吸水能を超えた水の量で組織化物を戻しているため生地が柔らかく成形性が悪く問題であり、ソフト感はあるものの、ジューシー感は加工食品H1①と同程度で不良であった。このように、単に水を加えただけや吸水能を超えた水量で水戻しした組織化物は、ソフト感はあるものの、ジューシー感付与効果には繋がらない結果となった。高吸水能（好ましくは5倍以上）を有し、該吸水能に応じた水量を保持した組織化物を用いることで、ソフト感があり、ジューシー感を保持させることが出来ると考えられた。従って、このような組織化物のうちで、ハンバーグに用いて、ハンバーグを冷凍した後解凍しても、冷凍前と同様のジューシー感をもたらす組織化物を組織状蛋白とした（以下の実施例においても同様である。）。

【0047】実施例2

（実施例2-A）表4の各原料配合を押出機に供し、各組織化物を得た。得られた各組織化物について、「組織化物の単品での評価」を実施した。

【0048】

【表4】

組織化物No	A1	A2	A3	A4	A5	A6
(原料配合(%))						
脱脂大豆	100	85	—	—	—	—
粉末状大豆蛋白	—	—	100	85	81	77
カゼインNa	—	15	—	15	14	13
食用植物油脂	—	—	—	—	5	10
(評価)						
吸水能(倍)	3.1	6.0	4.9	7.1	4.9	2.7
ソフト感(点)	4.3	7.2	5.0	9.5	5.1	2.6
風味(点)	2.9	5.4	6.7	9.5	9.5	9.5

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【0049】(実施例2-B)豚挽き肉21.0g、牛ひき肉23.0g、豚脂3.5g、玉ねぎ20.0g、凍結全卵2.5g、生クリーム2.5g、赤パン粉5.0g、調味料2.0g及び香辛料0.5gに、実施例2-Aで得られた各組織化物と水を配合して*

*ハンバーグ生地100gを調製し、「組織化物の複合系(ハンバーグ)での評価」を実施した。

【0050】

【表5】

(単位:g)

加工食品No.	H1①	H2①	H3①	H4①	H5①	H6①
組織化物水戻し品	20.0	20.0	20.0	20.0	20.0	20.0
(水)	15.1	17.1	16.6	17.5	16.6	14.6
(組織化物A1)	4.9	—	—	—	—	—
(組織化物A2)	—	2.9	—	—	—	—
(組織化物A3)	—	—	3.4	—	—	—
(組織化物A4)	—	—	—	2.5	—	—
(組織化物A5)	—	—	—	—	3.4	—
(組織化物A6)	—	—	—	—	—	5.4

(評価)

ジューシー感X(点)	9.7	9.7	9.5	9.8	9.6	9.5
ジューシー感Y(点)	3.4	8.0	4.2	9.6	5.3	3.4
ソフト感X(点)	4.2	7.4	6.2	9.6	5.3	2.5
ソフト感Y(点)	4.1	7.4	5.1	9.6	5.3	2.5
風味X(点)	5.4	7.1	6.9	9.5	9.0	8.6
風味Y(点)	5.2	7.0	6.8	9.5	8.5	8.1
成形性(点)	10.0	10.0	10.0	10.0	10.0	10.0

X: 作り立て

Y: 冷凍後再加熱

【0051】実施例2-Aおよび2-Bで示したように、やはり吸水能とソフト感、ジューシー感に関連があり、吸水能が高いほどジューシー感付与効果が高い傾向があった。組織化物A1、A3、加工食品H1①、H3①で示したように、大豆蛋白原料を脱脂大豆でなく、粉末状大豆蛋白を用いることで、風味は良くなったが、ジューシー感付与効果については、殆ど向上しなかった。しかし、組織化物A2、A4、加工食品H2①、H4①で示したようにカゼインNaを併用した場合、風味は更に良くなり、ソフト感、ジューシー感は飛躍的に向上した。なお、組織化物A5、A6、加工食品H5①、H6①で示したように、油を添加した場合、組織化物の膨化※40

※が阻害され、油の添加量が多くなるにつれ、吸水能、ジューシー感付与効果は低下し、油を10%添加した組織化物A6は、従来技術レベルである組織化物A1に近いレベルとなり不良であった。

【0052】実施例3

以下は原料配合の比較であり、比較例が含まれる。

(実施例3-A)表6の各原料配合を押出機に供し、各組織化物を得た。得られた各組織化物について、「組織化物の単品での評価」を実施した。

【0053】

【表6】

組織化物No.	A7	A8	A9	A10	A11	A12
(原料配合(%))						
粉末状大豆蛋白	85	85	85	68	80	—
小麦グルテン	15	—	—	—	—	—
WPC	—	15	—	—	—	—
MPC	—	—	15	—	—	—
カゼインNa	—	—	—	12	—	100
澱粉	—	—	—	20	20	—

(評価)

吸水能(倍)	2.1	2.0	4.8	9.4	4.9	0.8
ソフト感(点)	4.6	5.0	7.1	9.8	7.1	2.9
風味(点)	1.3	7.4	3.4	9.5	8.2	1.4

【0054】(実施例3-B)豚挽き肉21.0g、牛ひき肉23.0g、豚脂3.5g、玉ねぎ20.0g、凍結全卵2.5g、生クリーム2.5g、赤パン粉5.0g、調味料2.0g及び香辛料0.5gに、実施例3-Aで得られた各組織化物と水を配合して*10

*ハンバーグ生地100gを調製し、「組織化物の複合系(ハンバーグ)での評価」を実施した。

【0055】
【表7】

(単位:g)

加工食品No.	H7①	H8①	H9①	H10①	H11①	H12②
組織化物水戻し品	20.0	20.0	20.0	20.0	20.0	20.0
(水)	13.3	13.3	16.7	17.8	16.7	10.0
(組織化物A7)	6.7	—	—	—	—	—
(組織化物A8)	—	6.7	—	—	—	—
(組織化物A9)	—	—	3.3	—	—	—
(組織化物A10)	—	—	—	2.2	—	—
(組織化物A11)	—	—	—	—	3.3	—
(組織化物A12)	—	—	—	—	—	10.0
ジューシー感X(点)	9.7	9.6	9.6	9.7	9.6	9.5
ジューシー感Y(点)	3.4	2.9	7.8	9.6	4.4	1.4
ソフト感X(点)	4.8	4.7	7.3	9.5	7.2	3.3
ソフト感Y(点)	4.5	4.5	7.1	9.5	7.0	3.3
風味X(点)	5.3	7.4	3.9	9.8	7.2	2.2
風味Y(点)	5.2	7.2	3.5	9.8	6.9	1.8
成形性(点)	10.0	10.0	10.0	10.0	10.0	10.0

X: 作り立て

Y: 冷凍後再加熱

【0056】組織化物A7、A8、加工食品H7①、H8①で示したように小麦グルテンやWPCを利用すると吸水能の低い結果となり、ソフト感が無く、冷凍再加熱後のジューシー感も付与されなかった。また、組織化物A9、加工食品H9①で示したようにMPCを利用すると、ソフト感、ジューシー感はやや付与されたが、風味は強い乳臭を感じ好ましくなかった。また、カゼインNaを併用せずに澱粉を利用した組織化物A11、加工食品H11①は、ソフト感はあるものの、ジューシー感は十分に保持できなかった。一方、組織化物A10、加工食品H10①、で示したように、カゼインNaを利用すれば、澱粉を配合してもジューシー感は十分に保持出来※

※るものであった。組織化物A12、加工食品H12②で示したように、大豆蛋白原料を用いずカゼインNaのみで試作を行ったが、殆ど組織にならずキャラメル状となり、風味は乳臭がして不良であり、ハンバーグでのソフト感、ジューシー感は得られなかった。

【0057】実施例4

(実施例4-A) 下記の各原料配合を押出機に供し、各組織化物を得た。得られた各組織化物について、「組織化物の単品での評価」を実施した。

【0058】

【表8】

組織化物No.	A3	A13	A4	A14	A15	A16
(原料配合(%))						
粉末状大豆蛋白	100	95	85	60	40	15

(10)

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17						18
カゼインNa	-	5	15	40	60	85
吸水能 (倍)	4.9	6.8	7.1	7.4	6.0	3.1
ソフト感 (点)	5.0	9.6	9.5	9.4	6.0	3.7
風味 (点)	6.7	9.0	9.5	8.5	5.4	2.1

【0059】(実施例4-B) 豚挽き肉21.0g、牛ひき肉23.0g、豚脂3.5g、玉ねぎ20.0g、凍結全卵2.5g、生クリーム2.5g、赤パン粉5.0g、調味料2.0g及び香辛料0.5gに、実施例4-Aで得られた各組織化物と水を表9の通り*10

*り配合してハンバーグ生地100gを調製し、「組織化物の複合系(ハンバーグ)での評価」を実施した。

【0060】

【表9】

(単位: g)

加工食品No.	H3①	H13①	H4①	H14①	H15①	H16①
組織化物水戻し品	20.0	20.0	20.0	20.0	20.0	20.0
(水)	16.6	17.4	17.5	17.5	17.1	15.1
(組織化物A3)	3.4	-	-	-	-	-
(組織化物A13)	-	2.6	-	-	-	-
(組織化物A4)	-	-	2.5	-	-	-
(組織化物A14)	-	-	-	2.4	-	-
(組織化物A15)	-	-	-	-	2.9	-
(組織化物A16)	-	-	-	-	-	4.9
ジューシー感X (点)	9.5	9.8	9.8	9.5	9.5	9.6
ジューシー感Y (点)	4.2	9.4	9.6	9.5	6.2	2.9
ソフト感X (点)	6.2	9.5	9.6	9.5	6.3	3.8
ソフト感Y (点)	5.1	9.5	9.6	9.5	6.4	3.6
風味X (点)	6.9	9.5	9.5	8.7	5.4	2.4
風味Y (点)	6.8	9.5	9.5	8.5	5.1	2.3
成形性 (点)	10.0	10.0	10.0	10.0	10.0	10.0

X: 作り立て

Y: 冷凍後再加熱

【0061】組織化物A13、A4、A14が吸水能も高く、加工食品H13①、H4①、H14①で冷凍再加熱後もジューシー感、ソフト感もあり良好であった。カゼインNa無添加組織化物A3使用の加工食品H3①は、ジューシー感、ソフト感が少なかった。また、カゼインNaの添加を15%から40%に上げるとわずかながら乳臭が感じられた。カゼインNaの添加を組織化物A15の60%まで添加すると、吸水能は比較的高いがやや乳臭が感じられ、加工食品H15①は、ソフト感、ジューシー感がやや減少する傾向が見られた。カゼインNaの添加を組織化物A16のように85%と多くすると膨化しにくくなり吸水能も低く、乳臭を感じ不良※

※となり、また、加工食品H16①ではソフト感、ジューシー感が少なくなってしまった。本結果より、ソフトでかつジューシーな食感を付与する効果を発揮する為には、粉末状大豆蛋白/カゼインNaの比率が98/2~35/65、好ましくは98/2~45/55、更に好ましくは93/7~70/30であることが判った。

【0062】実施例5

(実施例5-A) 下記の各原料配合を押出機に供し、各組織化物を得た。得られた各組織化物について、「組織化物の単品での評価」を実施した。

【0063】

【表10】

組織化物No.	A4	A17	A10	A18	A19
(原料配合(%))					
粉末状大豆蛋白	85	77	68	51	17

19					
カゼインNa	15	13	12	9	3
澱粉	—	10	20	40	80
吸水能 (倍)	7.1	8.0	9.4	7.5	4.5
ソフト感 (点)	9.6	9.7	9.8	8.1	5.1
風味 (点)	9.5	9.7	9.5	9.7	9.8

【0064】(実施例5-B) 豚挽き肉21.0g、牛ひき肉23.0g、豚脂3.5g、玉ねぎ20.0g、凍結全卵2.5g、生クリーム2.5g、赤パン粉5.0g、調味料2.0g及び香辛料0.5g 10 * 通り配合してハンバーグ生地100gを調製し、「組織化物の複合系(ハンバーグ)での評価」を実施した。
【0065】
に、実施例5-Aで得られた各組織化物と水を表11の* 【表11】

(単位: g)

加工食品No.	H4①	H17①	H10①	H18①	H19①
組織化物水戻し品	20.0	20.0	20.0	20.0	20.0
(水)	17.5	17.5	17.5	17.3	16.4
(組織化物A4)	2.5	—	—	—	—
(組織化物A17)	—	2.5	—	—	—
(組織化物A10)	—	—	2.5	—	—
(組織化物A18)	—	—	—	2.7	—
(組織化物A19)	—	—	—	—	3.6
ジューシー感X (点)	9.8	9.8	9.7	8.9	5.6
ジューシー感Y (点)	9.6	9.7	9.6	8.5	4.5
ソフト感X (点)	9.6	9.7	9.5	8.6	4.9
ソフト感Y (点)	9.6	9.5	9.5	8.4	4.7
風味X (点)	9.5	9.6	9.8	9.6	9.5
風味Y (点)	9.5	9.6	9.8	9.5	9.5
成形性 (点)	10.0	10.0	10.0	9.0	8.5

X: 作り立て

Y: 冷凍後再加熱

【0066】組織化物A17、A10の澱粉添加系では組織化物A4の澱粉無添加系と同様の吸水能であった。加工食品H4①、H17①、H10①共に冷凍再加熱後も、ジューシー感、ソフト感が感じられた。組織化物A18は吸水能が有り、加工食品H18①で、ソフト感、ジューシー感も感じられたが、食感に澱粉特有のベチャつきがやや感じられた。組織化物A19は吸水能が低下し、加工食品H19①では、ソフト感、ジューシー感が低く、澱粉特有のベチャつきが顕著に現われベチャベチャし不良な食感になった。澱粉の添加については、無添加でもジューシー感の付与効果が見られた。本結果より、ジューシー感付与効果を発揮する為には、澱粉含量※

※は、60%以下、好ましくは30%以下であることが判った。

【0067】実施例6

牛挽き肉35.0g、豚ひき肉22.0g、豚脂12.0g、玉ねぎ12.0g、パン粉5.0g、馬鈴薯澱粉5.0g、凍結全卵5.0g、調味料3.0g及び香辛料1.0gに、実施例2-Aで得られた各組織化物A1、A2、A3、A4と水を表12の通り配合してミートボール生地100gを調製し、ミートボールの系で評価を実施した。

【0068】

【表12】

(単位: g)

加工食品No.	M0①	M1①	M2①	M3①	M4①
組織化物水戻し品	—	20.0	20.0	20.0	20.0

21					
(水)	—	15.1	17.1	16.6	17.5
(組織化物A1)	—	4.9	—	—	—
(組織化物A2)	—	—	2.9	—	—
(組織化物A3)	—	—	—	3.4	—
(組織化物A4)	—	—	—	—	2.5
ジューシー感X(点)	9.6	9.5	9.6	9.5	9.7
ジューシー感Y(点)	3.8	3.6	7.8	4.4	9.5
ソフト感X(点)	3.8	4.8	7.0	5.8	9.6
ソフト感Y(点)	3.4	4.7	7.0	5.5	9.4
風味X(点)	9.5	3.8	7.3	6.9	9.4
風味Y(点)	9.5	3.8	7.2	6.7	9.3
成形性(点)	10.0	10.0	10.0	10.0	10.0

【0069】ミートボールでも、ハンバーグ同様、加工食品M4①が風味も良く、冷凍再加熱後もソフトでかつジューシーな食感であり良好であった。これより、ミートボールのようにフライし蒸煮後、冷凍後再加熱を行っても同様の効果があることが判った。

【0070】実施例7

豚ひき肉30.0g、豚脂10.0g、キャベツ37.0g、玉ねぎ14.*

*0g、パン粉3.5g、ニラ1.0g、ごま油1.5g、調味料2.0g及び香辛料1.0gに、実施例2-Aで得られた各組織化物A1、A2、A3、A4と水を表13の通り配合して餃子生地100gを調製し、餃子の系で評価を実施した。

【0071】

20 【表13】

(単位:g)

加工食品No.	G0①	G1①	G2①	G3①	G4①
組織化物水戻し品	—	20.0	20.0	20.0	20.0
(水)	—	15.1	17.1	16.6	17.5
(組織化物A1)	—	4.9	—	—	—
(組織化物A2)	—	—	2.9	—	—
(組織化物A3)	—	—	—	3.4	—
(組織化物A4)	—	—	—	—	2.5
ジューシー感X(点)	9.7	9.7	9.6	9.5	9.8
ジューシー感Y(点)	3.6	3.5	7.4	4.3	9.7
ソフト感X(点)	3.9	4.9	6.8	5.3	9.2
ソフト感Y(点)	3.8	4.8	6.7	5.2	9.1
風味X(点)	9.7	3.8	4.9	6.7	9.6
風味Y(点)	9.5	3.5	4.7	6.5	9.5
成形性(点)	10.0	10.0	10.0	10.0	10.0

【0072】餃子でも、ハンバーグ同様、加工食品G4①が風味も良く、冷凍再加熱後もソフトでかつジューシーな食感であり良好であった。これより、餃子のように包餡し蒸煮後、冷凍再加熱で焼成を行っても同様の効果があることが判った。

【0073】

【発明の効果】本発明により、加工食肉製品が冷凍後、流通過程を経たのち、喫食時に再加熱を行っても、作り※

※たてのジューシー感を提供できる組織状蛋白の製造が可能になったものである。これは、カゼイン蛋白だけでは、組織化しないものを大豆蛋白原料とカゼイン蛋白を併用することで膨化させることができ、多くの水を抱きこむことで、加工食肉製品のジューシー感付与としての利用が可能になり、完成度の高い加工食肉製品を消費者に提供することが可能となった。

フロントページの続き

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the letter protein of an organization used for the processed food which has the same juicy feeling with make up even after freezing and thawing, and this processed food.

[0002]

[Description of the Prior Art] With change of the further social environments, such as having two incomes and the trend toward the nuclear family, the needs of a cooked processed food are increasing every year, and utilization with the table of the processing meat product which uses meat as the main raw material, or a cooked daily dish prospers. Although the pursuit to delicacy is increasing, the actual condition is that the precooked processed food cannot offer the delicacy to adorn up. the hamburger with which the juicy feeling which meat adorns up especially is called for, a meatball, a Chinese meat dumpling, and **** -- after cooking of the nice Chinese **** etc. is carried out by the manufacturer, the juicy feeling which it reheats at home etc. and is adorned up in the **** case has the trouble of not sensing, after the negotiation of refrigeration, refrigeration, etc. Although various measures have so far been made in order to solve this, it has not resulted in sufficient solution.

[0003] For example, in JP,11-103826,A, although MPC (milk protein concentrate) is used for juicy feeling grant and the juicy feeling grant effectiveness was accepted, sensibility of **** strong in flavor was poor. Moreover, the complicated process of adding to the ground what was heated and cut was required, and JP,2001-118,A was not enough as about [that workability is a problem bad] and the juicy feeling grant effectiveness, after making hydrocolloid, an oil, and water emulsify for juicy feeling grant.

[0004] By the way, extruding a vegetable protein raw material etc. under heating application of pressure, and manufacturing structured soy protein conventionally, has been performed. and the structured soy protein manufactured in this way -- a hamburger, a meatball, a Chinese meat dumpling, and **** -- it used for various processing meat products, such as being nice, as a substitute of meat, and raising the quality of these processing meat product has been performed widely (the feeling grant of a meat grain, improvement in the yield, feeling grant of software, etc.). However, it has come to make a juicy feeling give. The difference between these structured soy protein and the letter protein of an organization of this invention is as follows.

[0005] First, the structured soy protein which carries out application-of-pressure heating, extrudes soybean protein (especially defatted soybean), it was made to carry out plumping to the bottom of a drainage system, and was manufactured has small plumping compared with the letter protein of an organization of this invention, and it is the thing which also ***** (ed) mouthfeel after molten-bath return roughly and which senses, comes out and lacks in soft and juicy mouthfeel. Moreover, although the water absorption of plumping after molten-bath return

is also greatly large, the structured soy protein which added starch to soybean protein and was extruded similarly becomes mouthfeel which senses the viscosity [BECHABECHA / viscosity / when frozen and thawed], and cannot become soft and juicy mouthfeel like the processed food of this invention easily. Moreover, although the structured soy protein which uses starch together according to wheat protein and the need to soybean protein, extrudes similarly, and is obtained could also enlarge plumping depending on extrusion conditions, when molten-bath return is carried out and it uses for a hamburger, mouthfeel after freezing and thawing is stronger than the letter protein of an organization of this invention, is solid, and did not come to obtain soft and juicy mouthfeel. Moreover, since the structured soy protein which uses together soybean protein and WPC (milk whey protein), extrudes similarly, and is obtained does not have so good water absorption as this invention, even if plumping is stopped and the organization is also solid, and it uses it as it is, when it is used for cooking processed foods, such as a hamburger, the device of it being insufficient for becoming soft and juicy mouthfeel, and using polysaccharide together in a hamburger raw material is required. Moreover, the structured soy protein which plumping will be controlled and will be obtained if fats and oils are used even if fats and oils are indispensable business although the following is known as a conventional technique which uses soybean protein and casein for a raw material, carries out application-of-pressure heating under a drainage system, extrudes, and manufactures the letter protein of an organization, as for this invention, the objects differ and it uses soybean protein and casein together has low water absorption, and it is hard to become mouthfeel juicy [that it is the target software].

[0006] For example, the method of manufacturing the food which uses the soybean protein as fats and oils and an emulsifier for rennet casein, and has fibrous structure with an extruder is indicated by JP,63-192348,A. However, soybean protein is not what also plumped the food which does not pass to ***** for small quantity as an emulsifier, but has the fibrous structure obtained. Moreover, to JP,5-244877,A, even if it is the case where used together soybean protein, fats and oils, and casein, and the amount of an oil content increases, the systematized letter protein food of an organization is obtained, but since [that plumping is small] water absorption is lower than this invention, when it uses for a processed food, it is inadequate for giving soft and juicy mouthfeel.

[0007]

[Problem(s) to be Solved by the Invention] This invention is developed in view of this situation, and after a processed food's freezing, after passing through a negotiation process, even if it reheats at the time of eating, it aims at the ability to offer the juicy feeling to adorn up. And it aims at the letter protein of an organization which gives the starting juicy feeling.

[0008]

[Means for Solving the Problem] it be use for a processed food the letter protein of an organization which this invention person etc. made soybean protein , casein , and water indispensable , did heating application of pressure of the starch as occasion demands as a result of repeat research wholeheartedly said technical problem be solve , and he made extrude and carry out plumping into atmospheric air , and be obtained , and even after circulate by refrigeration , it find out that the processed food which have the same juicy feeling with make up at the time of reheating can provide , and this invention complete . That is, this invention is letter protein of an organization which carries out heating application of pressure of soybean protein, casein, and the water, extrudes in atmospheric air, and it comes to plump. It is desirable that the rates of the soybean protein/casein in this letter protein raw material of an organization are 98 / 2 - 35/65 (desiccation solid weight ratio). 60 or less (inside of raw material desiccation solid content) % of the weight has a desirable starch content in this letter protein raw material of an organization using starch. It is desirable that it is twice [5 - 12 weight] the water absorption power of this letter protein of an organization of this. The oil content in this

letter protein raw material desiccation solid content of an organization has 3 or less desirable % of the weight. Moreover, this invention is the manufacturing method of the processed food characterized by freezing after mixing, fabricating and carrying out cooking of the letter protein of an organization and processed food raw material of the above-mentioned publication.

[0009]

[Embodiment of the Invention] The letter protein of an organization of this invention is explained.

[0010] Although a defatted soybean, soybean milk powder, separation soybean protein, concentration soybean protein, etc. can be chosen from the group which consists of those mixture as soybean protein used for this invention, it is desirable to use especially separation soybean protein from a viewpoint of flavor. Although all fat soybeans can also be used, since an oil content exists just over or below 20 % of the weight by desiccation solid content, it is important that the oil content in the raw material before carrying out heating application of pressure and extruding so that it may mention later considers as 3 or less % of the weight. Although it changes with classes of soybean protein, in this invention, 98 - 45 % of the weight (desiccation solid weight ratio) is preferably suitable for the amount of the soybean protein in this letter protein raw material of an organization 98 to 35% of the weight.

[0011] Commercial casein can be used as casein used for this invention. For example, casein sodium (or sodium caseinate), rennet casein, etc. are desirable, and acid casein can be neutralized and used. That is, what was neutralized in the form of an alkali-metal salt is suitable. The casein used for this invention has many contents of casein protein compared with the following milk components, and its 95 % of the weight or more is usually preferably suitable for crude protein content 90% of the weight or more. Especially, sodium caseinate is suitable. By the way, what generally separated and carried out spray drying of the milk fat from milk is called skimmilk powder, and this contains casein, whey protein, and a whey saccharide. The thing except low-molecular fractions, such as this skimmilk powder to a whey saccharide, is MPC (milk protein concentrate), and contains both casein and whey protein. Moreover, the acid precipitate from skimmilk powder and the thing which was made to carry out rennet coagulation precipitate, could separate casein and carried out separation clearance of the whey saccharide from the remaining whey are WPC(s) (whey protein concentrate). Its content of casein protein is low including components other than casein, and since milk components, such as the above-mentioned skimmilk powder, and MPC, WPC, have not taken the form of an alkali-metal salt like sodium caseinate, the object achievement of this invention has very little effectiveness.

[0012] Although plumping will be promoted if soybean protein and casein are used together like this invention, and application-of-pressure heating is carried out and it extrudes under a drainage system, in concomitant use of soybean protein and skimmilk powder, plumping is inferior and strong **** becomes obstructive depending on the class of processed food. Strong **** is sensed the same and concomitant use of soybean protein and MPC also becomes obstructive depending on the class of processed food. It is in the inclination for plumping to be controlled still more, in concomitant use of soybean protein and WPC. Plumping is controlled as mentioned above, and when water absorption was low and it uses for a processed food, it is hard to become soft and juicy mouthfeel. this invention -- setting -- the amount of the casein in this letter protein raw material of an organization -- 2-65 -- 2-55 (desiccation solid weight ratio) are preferably suitable.

[0013] Although especially the amount of the water used for this invention is not limited, it can adjust operating an extruder so that the target letter protein of an organization may fully plump.

[0014] Moreover, as for this invention, it is desirable not to add fats and oils. When adding fats and oils, or when using the high raw material of an oil content, it is appropriate that the oil

content of the raw material before carrying out application-of-pressure heating, extruding and carrying out plumping considers as 1 or less % of the weight more preferably 2 or less % of the weight 3 or less % of the weight by desiccation solid content conversion. In order to promote plumping of the letter protein of an organization obtained even when using other raw materials by using soybean protein and casein as the main raw material, it is required for an oil content to be low. If the high raw material of an oil content is extruded with an extruder, even if plumping will be controlled, the water absorption power of the letter protein of an organization obtained will become small and it will use for a processed food, it becomes difficult for there to be soft and juicy mouthfeel.

[0015] In manufacture of the letter protein of an organization of this invention, it is desirable to use starch together as occasion demands to soybean protein and casein. If starch is used, the cost cut effectiveness is expectable, but when there were too many the additions, and this letter protein of an organization is used for a processed food and is frozen and thawed, it is not desirable at that (although there is a feeling of software, it is not juicy) which viscous-like mouthfeel [BECHABECHA / mouthfeel] discovers. Therefore, in this invention, even when the content of the starch in this letter protein raw material of an organization is higher than the content of the protein of soybean protein and it uses usual soybean protein below 60 % of the weight (desiccation solid weight %), it is suitable that it is below 30 % of the weight (desiccation solid weight %) preferably. In the case of contents other than the above, the description of starch is [appear notably, and] easy to become poor mouthfeel and is not desirable. Although starch is not necessarily required in order to attain the object of this invention, blending from a viewpoint of attaining the object more cheaply is desirable.

[0016] In this invention, the modified starch and the starch derivative which processed those pregelatinization and calcining, hydrolysis, etc., and alkali starch, such as a sweet potato, a potato, a ball Indian millet, tapioca, rice, barley, Oates, rye, an oat, buckwheat noodles, corn, wheat, a cassava, etc. and starch of these un-refining and these origins, fractionation starch, physical processing starch, etc. can be chosen from the group which becomes a list from the mixture as starch, for example.

[0017] although a protein content changes with the class of soybean protein, or classes of casein -- this invention -- setting -- the rate of the casein/soybean protein in this letter protein raw material of an organization -- 98 / 2 - 35/65 (desiccation solid weight ratio) -- 98 / 2 - 45/55 (desiccation solid weight ratio) are preferably suitable (not necessarily -- protein -- comparatively -- coming out -- there is nothing and a protein raw material comes out comparatively.). In the case of rates other than the above, the effectiveness which does not become soft and juicy mouthfeel, but is within the limits and gives [above-mentioned] soft and juicy mouthfeel is high. If there are few rates of casein and there are many rates of soybean protein, when about [that plumping of the letter protein of an organization obtained is not enough] and an organization uses for a processed food strongly, mouthfeel may ***** a juicy feeling is not not only obtained, but, and it may be as unsuitable as soft mouthfeel of a processed food. Moreover, if there are too many rates of casein and there are too few rates of soybean protein, plumping of the letter protein of an organization obtained will be controlled, and water absorption power will become small. That is, when this letter protein of an organization is used for a processed food, the effectiveness which gives soft and juicy mouthfeel is not acquired. Casein is thermofusion nature protein and this is because pressurizing and plumping is controlled.

[0018] Although the above is a principal component, proteins other than soybean protein and other than casein and raw materials other than protein can also be used together as occasion demands. For example, it can choose out of the group which consists of protein of the protein of an animal and the microorganism origin, an oil seed, or the grain seed origin, or its mixture. It is also possible to use together carbohydrates other than starch, polysaccharide, a gums,

etc.

[0019] An extruder (extruder) is suitable although equipment well-known as equipment which carries out application-of-pressure heating in this invention and which is extruded in atmospheric air can be used. It is more desirable to use the extruder which has a two or more-shaft shaft, in order to obtain stable plumping and the stable regurgitation, although a well-known extruder can be used as an extruder used for this invention and a 1 shaft extruder may be used for an effectiveness check etc. When an oil content exceeds 1 % of the weight, it becomes namely, less enough [1 shaft extruder] as with [plumping is controlled and] the target juicy feeling, although soybean protein and the letter protein of an organization obtained according to concomitant use of casein are plumped also with 1 shaft extruder and it can have soft and juicy mouthfeel, if the oil content of a raw material is 1 or less % of the weight. If an oil content is to 3 or less % of the weight when a biaxial extruder is used, it is the target software and sufficient plumping to give juicy mouthfeel can be started. It follows and the multi-screw extruder more than biaxial is desirable. An extruder can be used if it has the die with which has raw material delivery, mixing, compression, and a heating device in a screw, and a head barrel was further equipped in the inside of feeding opening and a barrel. even if a barrel has the jacket, it is not necessary to have it, and this heats it -- bending -- or it cools -- bending -- it is free.

[0020] The systematization conditions of this letter protein of an organization can be experimentally defined according to the letter protein of an organization made into the object. Specifically, the water used for systematization has 20 - 45 % of the weight preferably suitable for the moisture contained in the ground which consists of a raw material supplied to the extruder, addition water, etc. 15 to 50% of the weight. The letter protein of an organization which the object plumped in this moisture range can be obtained. Moreover, it is appropriate for the systematization temperature of this invention to heat at 150 degrees C - 185 degrees C, to pressurize 5-50kg/cm² more preferably, the head barrel temperature of 140 degrees C - 190 degrees C, and to extrude.

[0021] A cutter or a grinder can cut the letter protein of an organization obtained as mentioned above in suitable magnitude. When using for the processed food which uses ground meat, for example, a hamburger etc., as for this letter protein of an organization, it is desirable to adjust grain size to the magnitude of ground meat. Although this letter protein of an organization can be dried and used, the drum drying method, a fluidized-bed-drying method, the shelf type drying method, a freeze drying method, etc. can be used for it in this case.

[0022] Next, plumping is explained. It is appropriate to express with water absorption power as a suitable index of plumping. That is, it is because water absorption power is so large that plumping is large, and the effectiveness which gives soft and juicy mouthfeel is large when it uses for a processed food. Water absorption power was measured as follows and was similarly measured in the example.

[0023] (Measuring method of water absorption power) The weight (W) of the organization ghost water return article on the sieve after adding 450g water [25-degree C] and draining off water from the 30g sample for assessment with a colander for 1 minute after 10-minute neglect for 500ml beaker using the sieve of 30 meshes (500 micrometers of openings) was measured, and the water absorption scale factor (X) was computed with the following formula.

[Equation 1] $X = (W - 30) / 30$ [0024] As for water absorption power, it is [the letter protein of this organization obtained as mentioned above] desirable that moisture is 15 or less % of the weight to the weight of an organization ghost in 5 - 12 weight twice (it returns with 25 degree C, 10 minute, and 15 weight doubling water, and drains off water for 1 minute by ZARU). If water absorption power is less than [5 weight twice], soft and juicy mouthfeel cannot fully be given. Moreover, although water absorption power may exceed 12 weight twice, it is usually difficult to obtain the organization ghost exceeding 12 weight twice.

[0025] Next, the processed food of this invention is manufactured by freezing, after mixing, fabricating and carrying out cooking of the letter protein of an organization and processed food raw material which were mentioned above. Although water return is not necessarily required when the letter protein of an organization has very much moisture of a processed food raw material, it is appropriate to carry out water return and to usually use in the range below water absorption power. Using an aquosity solvent like seasoning liquid instead of water does not bar. Mixing can use well-known equipment and can knead it as occasion demands. Although shaping changes with target processed foods, well-known shaping equipment can be used. The target processed food can perform cooking suitably. Refrigeration can use a well-known freezer and its quick-freezing is more desirable than slow freezing.

[0026] The processed food which used the letter protein of an organization of this invention concretely is explained. A processed food will not be limited, especially if it is frozen foods, and it is the food of which the same juicy feeling as refrigeration before is required when it thaws. Including the letter protein of an organization of this invention, it kneads according to the processed food raw material and mixing, or the need, and fabricates, and if it is the frozen processed food which carried out cooking suitably, animality and a vegetable property will not be asked. In addition, although the addition to the processed food of the letter protein of an organization changes with classes of processed food, 10 - 60 % of the weight is preferably suitable for it five to 80% of the weight to the ground which prepared the letter protein of an organization returned with water using the raw material of a processed food. Although based also on the class of processed food, if there are few additions of the letter protein of an organization returned with water, it will be hard to discover the target juicy feeling, and if many [too], the property of a processed food will be lost.

[0027] As a vegetable processed food, the letter protein of an organization and tofu of this invention are mixed, it can season as occasion demands, it can heat, and can freeze, or the so-called tofu card solidified by the bittern for alkaline earth metal or tofu of the letter protein of an organization and soybean protein of this invention can be obtained mixing, by kneading and carrying out cooking and freezing, etc., for example.

[0028] although there is a daily dish prepared using ground meat etc. as a more concrete example of an animal processed food -- as these examples -- a hamburger, a meatball, a Chinese meat dumpling, and **** -- nice Chinese ****, a chicken nugget, a sausage, etc. can be mentioned. For example, the manufacturing method of a hamburger is illustrated. It is possible to mix with ground meat etc. and to use the letter protein of an organization beforehand returned in the amount of adding water within water absorption power. Although water return is also possible about the maceration of the letter protein of an organization, the seasoning liquid which added soy sauce, an alcoholic beverage, salt, a spice, extracts, a saccharide, fats and oils, an egg, etc. may be used if needed. moreover -- although the letter protein of an organization may use it in the amount of adding water according to water absorption power, returning -- the ground -- in consideration of an inner moisture content, the moisture shift at the time of heating, etc., you may use it in the amount of adding water below water absorption power, returning. Moreover, when thinking workability as important, the letter protein of an organization may be added by dryness as it is. First, ground meat is stirred by a mixer etc., and the letter protein of an organization, an egg, whipped cream, a seasoning, vegetables, starch, bread crumbs, etc. are added in order, it mixes, and the ground is created. Then, it fabricates, and it heat-treats so that main temperature may become 80 degrees C or more. About heat-treatment, baking, cooking, fly, etc. are possible. The processed food which carried out cooking is frozen.

[0029] After freezing the processed food of this invention, even if it thaws it and it eats by carrying out reheating etc., the description is in the effectiveness which is the same software and gives juicy mouthfeel with make up.

[0030]

[Example] Hereafter, although an example explains the embodiment of this invention, naturally it is mere explanation and, as for instantiation, connotation and extension of way-of-thinking thought do not have direct relation. In addition, it is henceforth indicated as "%""% of the weight."

[0031] (Extruder raw material explanation) The raw material used in the example of this invention is as follows.

- Defatted soybean powder used the FUJI OIL Co., Ltd. make.
(Component protein / 55% of anhydrous conversions, 6% of moisture)
- Powdered soybean protein used "Fujipro-R" by FUJI OIL [Co., Ltd.] Co., Ltd.
(Component protein / 91% of anhydrous conversions, 6% of moisture)
- Casein Na used the product "sodium caseinate" made from MURRAY GOULBURN FOOD.
(Component protein / 95% of anhydrous conversions, 4% of moisture)
- "MPC-UF80" by the mill coat company was used for MPC.
(Component protein / 84% of anhydrous conversions, 4% of moisture)
- WPC used the product "the cull pro WPC8002" made from CALPRO.
(Component protein / 78.8% of anhydrous conversions, 4.4% of moisture)
- Wheat gluten used the product "the A-guru SS" made from Glico Protective foods.
(Component protein / 77.5% of anhydrous conversions, 5% of moisture)
- Starch used the product "corn starch" made from Sanwa Starch.
(Component protein / anhydrous conversion 0%, 13% of moisture)
- Edible vegetable oil and fat used the "soybean sirasimeyu" by FUJI OIL Co., Ltd.
(Component protein / anhydrous conversion 0%, 0% of moisture)

[0032] (Production of the organization ghost by the extruder) The organization ghost was produced according to the following conditions with the extruder. The raw material carried out homogeneity mixing with the fine-particles stirrer etc., and the raw material of an extruder (KEI 45-25 made from the Yukikazu industry) was presented with it with water. The service condition was as in the following table 1. After carrying out coarse grinding of the organization ghost which came out of the extruder so that it may become the following grain size with a grinder, after cutting so that it may become die length of about 10mm by the cutter, it was dried to 10% of moisture with the dryer.

[0033]

[A table 1] - Extruder service-condition - ----- The amount of feeding 20kg / the amount of hr adding water 8 L/hr screw speed In the first half of a 200r.p.m. barrel
Temperature of goods In the second half of 30-100-degree-C barrel The temperature of goods 100-180 degrees C ----- Particle size distribution of an organization ghost : - The JIS standard sieve -2.5 mesh on (opening 8.00mm) 0%4 Mesh on (opening 4.75mm) 30%6 Mesh on (opening 3.36mm) 40%10 Mesh (opening 1.70mm)-20%10 Mesh pass (opening 1.70mm) 10% ----- [0034] - The assessment approach of an organization ghost - "Appraisal method in the item system of an organization ghost"

(The term of detailed explanation described water-absorption-power measurement.)

[0035] (Mouthfeel, assessment conditions of flavor) The organization ghost water return article added the 25-degree C water of an amount (if it is twice [3 weight] the water absorption power of this, they are 3 weight sections to the organization ghost 1 weight section) according to each water absorption power to the organization ghost, and produced it by leaving it 10 minutes or more so that an organization ghost may absorb water thoroughly. The obtained organization ghost water return article performed ten sample assessment about mouthfeel and flavor by law by ten persons' special panelist. About mouthfeel, the softest (software) thing was made into ten points, and what is sensed hard made mark low. About flavor, the tasteless odorless thing was made into ten points, and mark were made low, so that flavors, such as an

soybean and milk, were sensed.

[0036] the effectiveness at the time of using an "appraisal method in multicomputer system (system of processed food) of organization ghost" organization ghost for a processed food (for example, a hamburger, a meatball, a Chinese meat dumpling) -- each example -- a publication -- each -- the following cooking conditions estimated using combination of the ground. In addition, the organization ghost water return article used during combination of the ground added the 25-degree C water of an amount according to each water absorption power to the organization ghost, and produced it by leaving it 10 minutes or more so that an organization ghost may absorb water thoroughly.

[0037] - a hamburger -- the cooking condition-hamburger of the ground -- after shaping, the ground performed baking in oven for 200-degree-C 8 minutes, and obtained the hamburger so that it might be set to 100g per piece. At the time of shaping of the ground, the operator evaluated about the moldability and what cannot fabricate easily ten things which are easy to fabricate made mark low.

[0038] - a meatball -- the cooking condition-meatball of the ground -- after shaping, the ground performed cooking for 85-degree-C 10 minutes after 30-second fly from 175-degree C oil, and obtained the meatball so that it might be set to 15g per piece. At the time of shaping of the ground, the operator evaluated about the moldability and what cannot fabricate easily ten things which are easy to fabricate made mark low.

[0039] - a Chinese meat dumpling -- the cooking condition-Chinese meat dumpling of the ground -- the ground performed cooking for 90-degree-C 10 minutes after 30-second fly after bean jam wrapping and from 175-degree C oil with the wrapping sheet for a Chinese meat dumpling, and obtained the Chinese meat dumpling so that it might be set to 20g per piece. At the time of shaping of the ground, the operator evaluated about the moldability and what cannot fabricate easily ten things which are easy to fabricate made mark low.

[0040] - The assessment approach of a hamburger, a meatball, and a Chinese meat dumpling - After the obtained Chinese meat dumpling froze, it heated using the frying pan and performed ten sample assessment about mouthfeel and flavor by law with ten persons' special panelist. Ten points of mark are the best. About mouthfeel, what has a juicy feeling most was made into ten points, and mark were made low, so that the juicy feeling decreased and it could sense strong with PASA. About mouthfeel, the softest (software) thing was made into ten points, and what is sensed hard made mark low. About flavor, the thing with **** of meat was made into ten points, and it was made so low that other tastes are sensed strong.

[0041] - How [to attach processed food No. in an example]-H : a hamburger, M:meatball, G:Chinese meat dumpling *H1, and H2 are what was respectively made from the system of a hamburger using the organization ghosts A1 and A2 (table 2).

* Although ** was using the organization ghost in H1**, it distinguished to ** and ** by the difference in the amount of adding water.

* H0 is what did not use an organization ghost.

The table is carried out.

[0042] The extruder was presented with each raw material combination of the example 1 (example 1-A) following table 2, and each organization ghost was obtained. About each obtained organization ghost, "assessment by the item system of an organization ghost" was carried out.

[0043]

[A table 2]

----- organization ghost No. A1 A2----- (raw material combination (%))

Defatted soybean 100 85 casein Na - 15----- (assessment)

Water absorption power (twice) 3.1 Feeling of 6.0 software (point) 4.3 7.2 flavors (point) 2.9

5.4----- [0044] (Example 1-B) each organization ghost and water which were

obtained by example 1-A by 21.0g of pig ground meat, 23.0g of cow ground meat, 3.5g of lard, 20.0g of onions, 2.5g of freezing whole eggs, 2.5g of whipped cream, 5.0g of red bread crumbs, 2.0g of seasonings, and 0.5g of spices as a table 3 -- blending -- a hamburger -- 100g of grounds was prepared and "assessment by the multicomputer system (hamburger) of an organization ghost" be carried

[0045]

[A table 3]

(Unit: g)

----- Processed food No. H1** H2** H0** H0** H1** -----
 ----- organization ghost water return article 20.0 20.0 -- 20.0 () [water] 15.1 17.1 - 20.0 17.1
 (organization ghost A1) 4.9 - - - 2.9 (organization ghost A2) - 2.9 - - - -----
 juicy feeling X (point) 9.7 9.7 9.5 9.7 9.8 Juicy feeling Y (point) 3.4 8.0 3.4 4.0 4.4 Feeling X of
 software (point) 4.27.4 2.0 6.9 6.3 Feeling Y of software (point) 4.1 7.4 2.0 6.1 5.4 Flavor X
 (point) 5.4 7.8 10.0 4.8 6.7 Flavor Y (Point) 5.2 7.8 9.8 4.5 6.5 Moldability 10.0 (point) 10.0
 10.0 4.0 7.0 ----- X: Adorn up and it is after [Y:refrigeration] reheating

[0046]. As example 1-A and 1-B showed, the organization ghost A2 was the food raw material excellent in a feeling of software, and flavor as compared with the organization ghost A1. Moreover, processed food H2** was the outstanding processed food with the functionality that there is a feeling of software which a processed food adorns up as compared with processed food H1**, and after frozen reheating can fully maintain a juicy feeling. Thus, the organization ghost A2 was letter protein of an organization which has the function in which there is a feeling of software which a processed food adorns up, and after frozen reheating can fully maintain a juicy feeling, when it used for a processed food. Although processed food H0** is not using the organization ghost, it did not sense the juicy feeling after frozen reheating almost. To having not sensed a juicy feeling almost after frozen reheating, by processed food H2** using the organization ghost A2, the reason which after frozen reheating had is not concomitant use of a soybean protein raw material and a casein protein raw material, it thought that it might be because there is only much water, and processed food H0** was produced at processed food H1** using the conventional defatted soybean subject's organization ghost A1. processed food H0** -- simple -- water -- a hamburger -- the ground -- the water of an amount with which it added to inside and processed food H1** applied the organization ghost A1 to the water absorption power of the organization ghost A2 correspondingly -- returning -- the ground -- it adds to inside. as shown in example 1-B, the ground before baking is soft only by increasing the quantity of water simply like processed food H0** -- elapsing -- a moldability -- bad -- a problem -- it is -- a juicy feeling -- processed food H1** -- it senses almost similarly and was poor. Moreover, since the organization ghost was returned in the amount of the water with which processed food H0** exceeded water absorption power similarly, it is soft, a moldability is bad, the ground was a problem, and although there was a feeling of software, the juicy feeling was comparable as processed food H1**, and poor. Thus, the organization ghost which carried out water return by the amount of water [added / only / water] beyond water absorption power brought a result to which a feeling of software does not lead to the juicy feeling grant effectiveness of a certain thing. It has high water absorption power (preferably 5 or more times), and it is using the organization ghost holding the amount of water according to this water absorption power, there is a feeling of software, and it was considered that it can make a juicy feeling hold. Therefore, even if it thawed after using for the hamburger and freezing a hamburger among such organization ghosts, the organization ghost which brings about the same juicy feeling as refrigeration before was used as the letter protein of an organization (also in the following examples, it is the same.).

[0047] The extruder was presented with each raw material combination of example 2 (example 2-A) table 4, and each organization ghost was obtained. "Assessment with the item of an

organization ghost" was carried out about each obtained organization ghost.

[0048]

[A table 4]

----- organization ghost No A1 A2 A3 A4 A5 A6----- (raw material combination (%))

a defatted soybean -- -- 5 10 ----- 100 (assessment) 85 -- -- Powdered soybean protein -- 100 85 81 77 Casein Na - 15 - 15 14 13 Edible vegetable oil and fat - Water absorption power (twice) 3.1 6.0 4.9 7.1 4.9 2.7 Feeling of software (point) 4.3 7.2 5.0 9.5 5.1 2.6 Flavor (point) 2.9 5.4 6.7 9.5 9.5 9.5----- [0049] (Example 2-B)

each organization ghost and water which were obtained by example 2-A by 21.0g of pig ground meat, 23.0g of cow ground meat, 3.5g of lard, 20.0g of onions, 2.5g of freezing whole eggs, 2.5g of whipped cream, 5.0g of red bread crumbs, 2.0g of seasonings, and 0.5g of spices -- blending -- a hamburger -- 100g of grounds was prepared and "assessment by the multicomputer system (hamburger) of an organization ghost" be carried out.

[0050]

[A table 5]

(Unit: g)

----- processed food No. H1** H2** H3** H4** H5** H6** -----

----- organization ghost water return article 20.0 () 20.0 20.0 20.0 20.0 20.0 [water] 15.1 17.1 16.6 17.5 16.6 14.6 (organization ghost A1) 4.9 - - - - Organization ghost A2 - 2.9 - - - - (organization ghost A3) - - 3.4 - - - (organization ghost A4) - - - 2.5 - - (organization ghost A5) - - - 3.4 - (organization ghost A6) - - - - 5.4----- (assessment)

Juicy feeling X (point) 9.7 9.7 9.5 9.8 9.6 9.5 Juicy feeling Y (point) 3.4 8.0 4.2 9.6 5.3 3.4 A feeling X of software (point) 4.2 7.4 6.2 9.6 5.3 2.5 Feeling Y of software (point) 4.1 7.4 5.1 9.6 5.3 2.5 Flavor X (Point) 5.4 7.1 6.9 9.5 9.0 8.6 Flavor Y (Point) 5.2 7.0 6.8 9.5 8.5 8.1 Moldability (point) 10.0 10.0 10.0 10.0 10.0 10.0 ----- X: Adorn up and it

is after [Y:refrigeration] reheating [0051]. As example 2-A and 2-B showed, too, water absorption power, a feeling of software, and a juicy feeling had relation, and they had the inclination for the juicy feeling grant effectiveness to be high, so that water absorption power was high. As organization ghost A1, A3, and processed food H1** and H3** showed, although flavor became good by using not a defatted soybean but powdered soybean protein about the soybean protein raw material, about the juicy feeling grant effectiveness, it hardly improved. However, as organization ghost A2, A4, and processed food H2** and H4** showed, when Casein Na was used together, flavor became still better and a feeling of software and a juicy feeling improved by leaps and bounds. In addition, the organization ghost A6 which water absorption power and the juicy feeling grant effectiveness fell, and added the oil 10% sets to the level near the organization ghost A1 which is skill level conventionally and was poor as organization ghost A5, A6, processed food H5**, and H6** showed, plumping of an organization ghost was checked and the addition of an oil increased, when an oil was added. [0052] Three or less example is the comparison of raw material combination, and the example of a comparison is included.

(Example 3-A) The extruder was presented with each raw material combination of a table 6, and each organization ghost was obtained. "Assessment with the item of an organization ghost" was carried out about each obtained organization ghost.

[0053]

[A table 6]

----- organization ghost No. A7 A8 A9 A10 A11 A12----- (raw material combination (%))

Powdered soybean protein 85 85 85 68 80 - Wheat gluten 15 - - - - WPC - 15 - - - - MPC - - 15 - - - Casein Na - - - 12 - 100 Starch - - 2020 - ----- (assessment)

Water absorption power (twice) 2.1 2.0 4.8 9.4 4.9 0.8 Feeling of software (point) 4.6 5.0 7.1 9.8 7.1 2.9 Flavor (point) 1.3 7.4 3.4 9.5 8.2 1.4----- [0054] (Example 3-B) each organization ghost and water which were obtained by example 3-A by 21.0g of pig ground meat, 23.0g of cow ground meat, 3.5g of lard, 20.0g of onions, 2.5g of freezing whole eggs, 2.5g of whipped cream, 5.0g of red bread crumbs, 2.0g of seasonings, and 0.5g of spices -- blending -- a hamburger -- 100g of grounds was prepared and "assessment by the multicomputer system (hamburger) of an organization ghost" be carried out.

[0055]

[A table 7]

(Unit: g)

----- processed food No. H7** H8** H9** H10** H11** H12** -----
 ----- organization ghost water return article 20.0 () 20.0 20.0 20.0 20.0 20.0 [water]
 13.3 13.3 16.7 17.8 16.7 10.0 (organization ghost A7) 6.7 - - - - Organization ghost A8 - 6.7 -
 - - - (organization ghost A9) - - 3.3 - - - (organization ghost A10) - - - 2.2 - - (organization ghost
 A11) - - - 3.3 - (organization ghost A12) - - - - 10.0 ----- juicy feeling X
 (point) 9.79.6 9.6 9.7 9.6 9.5 juicy feeling Y (point) 3.4 2.9 7.8 9.6 4.4 1.4 Feeling X of software
 (point) 4.8 4.7 7.3 9.5 7.2 3.3 Feeling Y of software (point) 4.5 4.5 7.1 9.5 7.0 3.3 Flavor X
 (point) 5.3 7.4 3.9 9.8 7.2 2.2 Flavor Y (Point) 5.2 7.2 3.5 9.8 6.9 1.8 Moldability (point) 10.0
 10.0 10.0 10.0 10.0 10.0 ----- X: Adorn up and it is after [Y:refrigeration]
 reheating [0056]. If wheat gluten and WPC are used as the organization ghosts A7 and A8,
 processed food H7**, and H8** showed, a low result of water absorption power will be brought,
 there is no feeling of software, and the juicy feeling after frozen reheating was not given, either.
 Moreover, as organization ghost A9 and processed food H9** showed, when MPC was used,
 although a feeling of software and a juicy feeling were given a little, it senses strong **** and
 was not desirable [the feeling / flavor]. Moreover, in the organization ghost A11 and
 processed food H11** which used starch, without using Casein Na together, a feeling of
 software was not fully able to hold the juicy feeling of a certain thing. on the other hand, it
 came out, and as shown, when using Casein Na, even if it blended starch, juicy feelings were
 the organization ghost A10, processed food H10**, and the thing that can fully be held.
 Although a prototype was built from Casein Na not using the soybean protein raw material as
 the organization ghost A12 and processed food H12** showed, it hardly became **** but
 became caramel-like, and flavor carries out [****] and is poor and a feeling of software in a
 hamburger and a juicy feeling were not obtained.

[0057] The extruder was presented with each raw material combination of the example 4
 (example 4-A) following, and each organization ghost was obtained. "Assessment with the item
 of an organization ghost" was carried out about each obtained organization ghost.

[0058]

[A table 8]

----- organization ghost No. A3 A13 A4 A14 A15 A16-----
 (raw material combination (%))

Powdered soybean protein 100 95 85 60 40 15 Casein Na - 5 15 40 60 85 -----

---- water absorption power (twice) 4.9 6.8 7.1 7.4 6.0 3.1 Feeling of software (point) 5.0 9.6
 9.5 9.4 6.0 3.7 Flavor (point) 6.7 9.0 9.5 8.5 5.4 2.1 ----- [0059] (Example 4-

B) each organization ghost and water which were obtained by example 4-A by 21.0g of pig
 ground meat, 23.0g of cow ground meat, 3.5g of lard, 20.0g of onions, 2.5g of freezing whole
 eggs, 2.5g of whipped cream, 5.0g of red bread crumbs, 2.0g of seasonings, and 0.5g of
 spices -- the passage of a table 9 -- blending -- a hamburger -- 100g of grounds be prepared
 and "assessment by the multicomputer system (hamburger) an organization ghost" be carried

[0060]

[A table 9] (Unit: g)

----- processed food No. H3** H13** H4** H14** H15** H16** -----
 ----- organization ghost water return article 20.0 () 20.0 20.0 20.0 20.0 20.0 [water]
 16.6 17.4 17.5 17.5 17.1 15.1 (organization ghost A3) 3.4 - - - - Organization ghost A13- 2.6
 - - - - (organization ghost A4) - - 2.5 - - - (organization ghost A14) - - - 2.4 - - (organization
 ghost A15) - - - - 2.9 - (organization ghost A16) - - - - 4.9 ----- juicy
 feeling X (point) 9.5 9.8 9.8 9.5 9.5 9.6 juicy feeling Y(point) 4.2 9.4 9.6 9.5 6.2 2.9 Feeling X of
 software (point) 6.2 9.5 9.6 9.5 6.3 3.8 Feeling Y of software (point) 5.1 9.5 9.6 9.5 6.4 3.6
 flavor X (point) 6.9 9.5 9.5 8.7 5.4 2.4 flavor Y (point) 6.8 9.5 9.5 5.1 2.3 Moldability (point)
 10.0 10.0 10.0 10.0 10.0 10.0 ----- X: Adorn up and it is after
 [Y:refrigeration] reheating [0061]. Also as for water absorption power, the organization ghost
 A13, A4, and A14 were high, and a feeling of a juicy feeling and software of after frozen
 reheating is and was also good at processed food H13**, H4**, and H14**. Processed food
 H3** of a casein Na additive-free organization ghost A3 activity had few feeling of a juicy
 feeling and software. Moreover, **** was sensed, although it was small when addition of
 Casein Na was raised to 40% from 15%. When addition of Casein Na was added to 60% of the
 organization ghost A15, although water absorption power was comparatively high, **** was
 sensed a little, and, as for processed food H15**, the inclination for a feeling of software and a
 juicy feeling to decrease a little was seen. When addition of Casein Na was made [many] with
 85% like the organization ghost A16, it was hard coming to plump, and water absorption power
 was also low, and it became poor sensing ****, and a feeling of software and a juicy feeling
 have decreased in processed food H16**. in order to demonstrate the effectiveness which
 gives mouthfeel soft juicier than this result -- the ratio of powdered soybean protein / casein Na
 -- 98 / 2 - 35/65 -- it turned out preferably 98 / 2 - 45/55, and that it is 93 / 7 - 70/30 still more
 preferably.

[0062] The extruder was presented with each raw material combination of the example 5
 (example 5-A) following, and each organization ghost was obtained. "Assessment with the item
 of an organization ghost" was carried out about each obtained organization ghost.

[0063]

[A table 10]

----- organization ghost No. A4 A17 A10 A18 A19----- (raw
 material combination (%))
 Powdered soybean protein 85 77 68 51 17 Casein Na 15 13 12 9 3 Starch - 10 20 40 80 -----
 ----- water absorption power (twice) 7.1 8.0 9.4 7.5 4.5 A feeling of software (point)
 9.6 9.7 9.8 8.1 5.1 Flavor (point) 9.5 9.7 9.5 9.7 9.8----- [0064] (Example 5-B)
 each organization ghost and water which were obtained by example 5-A by 21.0g of pig
 ground meat, 23.0g of cow ground meat, 3.5g of lard, 20.0g of onions, 2.5g of freezing whole
 eggs, 2.5g of whipped cream, 5.0g of red bread crumbs, 2.0g of seasonings, and 0.5g of
 spices -- the passage of a table 11 -- blending -- a hamburger -- 100g of grounds be prepared
 and "assessment by the multicomputer system (hamburger) an organization ghost" be carried
 [0065]
 [A table 11]
 (Unit: g)

----- processed food No. H4** H17** H10** H18** H19** -----
 -- organization ghost water return article 20.0 () 20.0 20.0 20.0 20.0 [water] 17.5 17.5 17.5
 17.3 16.4 (organization ghost A4) 2.5 - - - - (organization ghost A17) - 2.5 - - - (organization
 ghost A10) - - 2.5 - - (organization ghost A18) - - - 2.7 - (organization ghost A19) - - - - 3.6 -----
 ----- juicy feeling X (point) 9.8 9.8 9.7 8.9 5.6 Juicy feeling Y (point) 9.6 9.7 9.6
 8.5 4.5 Feeling X of software (point) 9.6 9.7 9.5 8.6 4.9 A feeling Y of software (point) 9.6 9.5
 9.5 8.4 4.7 Flavor X (point) 9.5 9.6 9.8 9.6 9.5 Flavor Y (point) 9.5 9.6 9.8 9.5 9.5 Moldability
 (point) 10.0 10.0 10.0 9.0 8.5 ----- X: Adorn up and it is after

[Y:refrigeration] reheating [0066]. By the starch addition system of the organization ghosts A17 and A10, it was the same water absorption power as the starch additive-free system of organization ghost A4. A feeling of a juicy feeling and software was sensed [processed food H4**, H17**, and H10**] also even for after frozen reheating. Although the organization ghost A18 has water absorption power, it is processed food H18** and a feeling of software and a juicy feeling were also sensed, it sensed with [peculiar to starch] BECHA by mouthfeel a little. Water absorption power fell and the organization ghost A19 had a feeling of software, and a low juicy feeling in processed food H19**, and expression BECHABECHA of it was notably carried out with [peculiar to starch] BECHA, and it became poor mouthfeel. About addition of starch, the grant effectiveness of a juicy feeling was seen also by additive-free. This result showed that a starch content was 30% or less preferably 60% or less, in order to demonstrate the juicy feeling grant effectiveness.

[0067] each organization ghosts A1 and A2, A3, A4, and water which were obtained by example 2-A by 35.0g of example 6 cow ground meat, 22.0g of pig ground meat, 12.0g of lard, 12.0g of onions, 5.0g of bread crumbs, 5.0g of potato starch, 5.0g of freezing whole eggs, 3.0g of seasonings, and 1.0g of spices -- the passage of a table 12 -- blending -- a meatball -- 100g of grounds be prepared and the system a meatball estimated

[0068]

[A table 12]

(Unit: g)

processed food No.	M0**	M1**	M2**	M3**	M4**
organization ghost water return article - ()	20.0	20.0	20.0	20.0	[water] - 15.1 17.1 16.6 17.5
(organization ghost A1) - 4.9	---	(organization ghost A2) - 2.9	---	(organization ghost A3) - 3.4	---
(organization ghost A4) - 2.5	---	juicy feeling X (point)	9.6	9.5	9.6
juicy feeling Y (point)	3.8	3.6	7.8	4.4	9.5
Feeling X of software (point)	3.8	4.8	7.0	5.8	9.6
Feeling Y of software (point)	3.4	4.7	7.0	5.5	9.4
Flavor X (Point)	9.5	3.8	7.2	6.7	9.3
Moldability (point)	10.0	10.0	10.0	10.0	10.0

[0069] Like [a meatball] the hamburger, flavor was good, processed food M4** was soft and juicy mouthfeel, and after frozen reheating had it. [good] This showed that there was same effectiveness; even if it carried out fly like a meatball and performed reheating after refrigeration after cooking.

[0070] each organization ghosts A1 and A2, A3, A4, and water which were obtained by example 2-A by 30.0g [of example 7 pig ground meat], 10.0g [of lard, and cabbage 37.0g, 14.0g / of onions /, 3.5g / of bread crumbs, and scallion 1.0g, 1.5g of sesame oil, 2.0g of seasonings, and 1.0g of spices -- the passage of a table 13 -- blending -- a Chinese meat dumpling -- 100g of grounds was prepared and the system of a Chinese meat dumpling estimated.

[0071]

[A table 13]

(Unit: g)

Processed food No.	G0**	G1**	G2**	G3**	G4**
An organization ghost water return article - 20.0 ()	20.0	20.0	20.0	20.0	[water] - 15.1 17.1 16.6 17.5
(organization ghost A1) - 4.9	---	Organization ghost A2 - 2.9	---	Organization ghost A3 - 3.4	---
Organization ghost A4 - 2.5	---	Juicy feeling X (point)	9.7	9.7	9.6
juicy feelings Y (point)	3.6	3.5	7.4	4.3	9.7
Feeling X of 9.7 software (point)	3.9	4.9	6.8	5.3	9.2
Feeling Y of 9.2 software (point)	3.8	4.8	6.7	5.2	9.1
flavor X (Point)	9.7	3.8	4.9	6.7	9.6
flavors Y (point)	9.5	3.5	4.7	6.5	9.5
moldabilities (point)	10.0	10.0	10.0	10.0	10.0

[0072] Like [a Chinese meat dumpling] the hamburger, flavor was good, processed food G4** was soft and juicy mouthfeel, and after frozen reheating had it. [good] This showed that there was same effectiveness, even if it carried out bean jam wrapping like a Chinese

meat dumpling and calcinated by frozen reheating after cooking.

[0073]

[Effect of the Invention] By this invention, after a processing meat product's freezing, after passing through a negotiation process, even if it reheats at the time of eating, manufacture of the letter protein of an organization which can offer the juicy feeling of structure length is attained. This can carry out plumping of what is not systematized by using together a soybean protein raw material and casein protein only in casein protein, are winning much water, the utilization as juicy feeling grant of a processing meat product is attained, and it is highly complete. It became possible to provide a consumer with a processing meat product.

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CLAIMS

[Claim(s)]

[Claim 1] Letter protein of an organization which carries out heating application of pressure of soybean protein, casein, and the water, extrudes in atmospheric air, and it comes to plump.

[Claim 2] Letter protein of an organization of claim 1 whose rates of the soybean protein/casein in this letter protein raw material of an organization are 98 / 2 - 35/65 (desiccation solid weight ratio).

[Claim 3] Letter protein of an organization of claim 1 or claim 2 whose starch content in this letter protein raw material of an organization is 60 or less (inside of raw material desiccation solid content) % of the weight using starch.

[Claim 4] One letter protein of an organization of claims 1-3 they are twice [5 - 12 weight] whose water absorption power of this letter protein of an organization of this.

[Claim 5] One letter protein of an organization of claims 1-4 whose oil contents in this letter protein raw material desiccation solid content of an organization are 3 or less % of the weight.

[Claim 6] The manufacturing method of the processed food characterized by freezing after mixing, fabricating and carrying out cooking of one of the letter proteins of an organization and processed food raw materials of claim 1 - claim 5.

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